

We claim:

1. An ion trap-based system for chemical analysis, comprising:
an ion trap array, said ion trap array including a plurality of ion traps arranged in a 2-dimensional array for initially confining ions, each of said ion traps comprising a central electrode having an aperture, a first and second insulator each having an aperture sandwiching said central electrode, and first and second end cap electrodes each having an aperture sandwiching said first and second insulator,
structure for simultaneously directing a plurality of different species of said ions out from at least one of said ion traps, and
a spectrometer including a detector for receiving and identifying said ions.
2. The system of claim 1, wherein said spectrometer comprises a time-of-flight mass spectrometer.
3. The system of claim 1, wherein said spectrometer comprises an ion mobility spectrometer.
4. The system of claim 1, wherein an entire length between said second end cap electrode and said detector is a drift region.
5. The system of claim 1, further comprising an acceleration grid disposed between said second end cap electrode and said detector.

6. The system of claim 1, wherein said ion traps each have an effective radius r_0 and an effective length $2z_0$, wherein at least one of r_0 and z_0 are less than 1.0 mm, and a ratio z_0/r_0 is greater than 0.83.

7. The system of claim 1, wherein r_0 and z_0 are both less than 1.0 mm.

8. The system of claim 1, wherein said plurality of ion traps have substantially equal geometries.

9. The system of claim 1, wherein said trap array includes ion traps having different geometries.

10. The system of claim 1, wherein said central electrodes, said first and second insulators, and said first and second end cap electrodes are each formed from a single plate.

11. The system of claim 1, further comprising an ionization source for generating said ions.

12. The ion trap of claim 11, wherein said ionization source comprises a field emitting array, laser beam source or an electron impact (EI) ionization source.

13. A method of chemical analysis, comprising the steps of:

confining a plurality of ions to an ion trap array, said ion trap array including a plurality of ion traps arranged in a 2-dimensional array for initially confining ions, each of said ion traps comprising a central electrode having an aperture, a first and second insulator each having an aperture sandwiching said central electrode, and first and second end cap electrodes each having an aperture sandwiching said first and second insulator,

simultaneously directing a plurality of different species of said ions out from at least one of said ion traps, and

identifying said ions.

14. The method of claim 13, wherein said method comprises time-of-flight mass spectrometry.

15. The method of claim 13, wherein said method comprises ion mobility spectrometry.